

Indian Forest Bulletin No. 166

(New Series)

Mycology

STUDIES ON INDIAN THELEPHORACEAE

I. SOME SPECIES OF STEREUM, PENIOPHORA AND CORTICIUM

BY

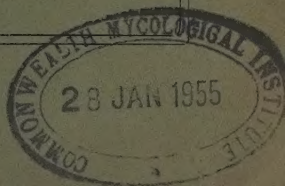
K. BAGCHEE & B. K. BAKSHI

Mycology Branch, Forest Research Institute, Dehra Dun



PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI
PRINTED AT THE GOVT. OF INDIA PRESS, NASIK ROAD
1954

Price: Rs. 1-8-0 or 25h. 3d.



STUDIES ON INDIAN THELEPHORACEAE

I. SOME SPECIES OF STEREUM, PENIOPHORA AND CORTICIUM

BY

K. BAGCHEE AND B. K. BAKSHI

Mycology Branch, Forest Research Institute, Dehra Dun

In the herbarium of the Forest Research Institute, Dehra Dun, there is an excellent collection of wood-rotting fungi among which members of the Thelephoraceae form a large percentage. The Hymenomycetous flora of India, particularly from the sub-tropical and temperate regions, is surprisingly similar to that of tropical and sub-tropical America and to a less extent to that of sub-temperate Europe. In ascribing a correct and valid name to a fungus, therefore, a student must become familiar with the forms that occur in America and Europe, or else get the collection identified and authenticated from workers in those countries, since it is difficult to carry out the identification here in the absence of types and of an authentic collection of specimens. Published descriptions of fungi are helpful but certainly cannot be relied upon in many cases especially when such descriptions lack an account of fundamental characters like basidia, spores or anatomical structures. In the study of the Indian members of the Thelephoraceae, therefore, it is felt that progress will be best served by careful descriptions and illustrations of the forms which have been correctly named. The present paper, the first in the series, includes a study of 14 species, of which 6 are recorded for the first time in India.

Collections have mostly been made from temperate regions of the Himalayas in the divisions of Chakrata (alt. 6,000—9,000 ft.), Kulu (alt. 6,000—10,000 ft.), Bashahr (alt. 6,000—10,000 ft.), Nainital (alt. 6,000—7,000 ft.), Almora (alt. 6,000—7,000 ft.) and Haldwani (alt. 500—2,000 ft.), Timli, Lachiwala, New Forest, Dehra Dun (about 2,000 ft.), and Kurseong (about 4,000 ft.) and also from the plains of different parts of India. One or two specimens of most of the fungi have been identified at the Royal Botanic Gardens, Kew, by Miss E. M. Wakefield to whom our sincere thanks are due.

Materials have been studied fresh wherever possible at which stage the colour of the sporophores and characters of basidia and spores are specially noted, since in dried up specimens, the colour changes (though colours of herbarium specimens are also noted), the basidia may collapse and the spores shrivel. In the field where immediate study of sporophores is not possible, they are partially dried and brought to the laboratory. Such fruit bodies are activated by putting them in a moist chamber. Spore-prints are then taken on agar as well as on dry slides and on a clean, white smooth preferably oily paper, the latter meant for collection in the herbarium. The colour of the spores is noted from water mounts. Measurements and other characters of spores are noted immediately from preparations in lacto-phenol cotton blue. Since the spores tend to swell by absorbing water when the spore-print is taken on agar, such spores are not taken for purposes of measurements. Spores from dried herbarium specimens may, on the contrary, shrink and present spurious measurements. Sections are cut from the activated fruit bodies, mounted in lacto-phenol and lacto-phenol cotton blue when basidia are seen in normal condition. Other anatomical details are also noted at this stage.

STEREUM HIRSUTUM WILLDENOW EX FRIES (FIG. 1)

Occurrence.—Commonly found in the Himalayas on dead *Quercus* and coniferous wood like *Cedrus deodara*, *Picea morinda* from Nainital, Almora, Dehra Dun, Chakrata, Kulu and Bashahr and also on sal (*Shorea robusta*) pole in Buxa Duars (W. Bengal) and Calcutta. Very common.

Sporophore: Fructifications coriaceous, drying stiff, effuso-reflexed or reflexed, sometimes resupinate, imbricate, margin folded across; upper surface densely strigose-hirsute, lightly concentrically furrowed, 'orange buff'* becoming greyish when old; context 0.5–0.8 mm. thick excluding hairy zone which is about 0.2 mm. thick, hairs hyaline or light yellow, slightly thick-walled, 2.8–3.5 μ broad, intermediate layer of longitudinally arranged hyphae hyaline, thick-walled (Fig. 1a) with hyaline crystalline incrustations (Fig. 1b), 2.5–7.8 μ broad, bordered on upper surface by a dense narrow golden zone; hymenial surface smooth or slightly cracked, sometimes with small raised humps 0.2–0.3 mm. broad, 'warm buff', 'pinkish buff', 'avellaneous', 'light drab' when fresh becoming 'pale smoke grey' when dry, margin light orange yellow; basidia subclavate (Fig. 1c), 10–15 \times 4.2–5.5 μ , sterigmata 4, 5.7 \times 1.4 μ ; basidiospores hyaline, elliptic, flattened on one side with a minute apiculus (Fig. 1d), 4.3–6.3 \times 2.6–3.2 μ ; conducting organs rarely present in the hymenium, filled with golden yellow contents.

Rot.—White stringy rot with brown zone lines in the wood.

Specimens examined: Uttar Pradesh: Chakrata, on oak wood—Deoban, May 23, 1934, **2231†**; July 7, 1945, **4121, 4173**; September 28, 1946, **4494, 4516**; July 1, 1947, **4700**; September 9, 1949, **5322, 5323, 5324**; Konain, Aug. 8, 1942, **4128**; September 23, 1945, **3985**; Mundali, August 8, 1942, **4129**; August 12, 1943, **3680**: on coniferous wood, usually deodar (*Cedrus deodara*) and spruce (*Picea morinda*)—Mundali, June 22, 1936, **2228**; October 11, 1943, **3721**; Konain, September 23, 1945, **3926**: on oak—Nainital, Bhowali, November 6, 1932, **2209**; Almora, Ranikhet, November 2, 1932, **2230**; Haldwani, Jaulasal, February 2, 1943, **3560, 3593**; on ascu treated sal (*Shorea robusta*)—New Forest, September 23, 1938, **3016**; Timli, April 3, 1946, **4274**. East Punjab: on oak wood—Kulu, Dhara, October 2, 1940, **3080**; on deodar (*C. deodara*)—Kasol, October 10, 1940, **4025**; Pulga, October 4, 1940, **4032**. Himachal Pradesh: Bashahr, Baghi, on oak, September 11, 1941, **3344**. West Bengal, Buxa Duars, on sal pole, February 2, 1945, **3846**, Calcutta, September 16, 1930, **2210**. Bihar, Bishenpur, on sal log, January 13, 1949, **4971**.

STEREUM FASCIATUM SCHWEINITZ (FIG. 2 AND PL. I, FIG. 1)

Occurrence.—On dead *Quercus*, *Betula utilis*, *Prunus*, *Picea morinda*, *Abies pindrow* and other hosts and rarely on living trees from Almora, Chakrata, Kulu, Kurseong, Assam and Calcutta. Very common.

Sporophore: Fructifications coriaceous, effuso-reflexed or reflexed (Pl. I, fig. 1), substipitate; upper surface densely tomentose, 'cream buff' at length becoming 'pale smoke grey', tomentum continuous up to margin, sometimes torn apart to form narrow concentric zones (Pl. I, fig. 1) which show 'hazel' or 'chestnut' in bared areas, margin entire, slightly lobate; context 0.4–0.6 mm. thick excluding tomentose layer which is 1 mm. thick, intermediate layer of hyphae longitudinal, hyaline, thick-walled (Fig. 2a), 2.8–5.6 μ broad, bordered on upper surface by a narrow golden yellow zone which bears hairs of the tomentose covering, hairs hyaline, thick-walled (Fig. 2b), 3–6 μ broad, crystals present in context; hymenial surface faintly zoned, 'pale yellow orange', 'light ochraceous buff', 'pinkish buff'; basidia clavate (Fig. 2c), 10–13 \times 3–4 μ sterigmata 4, 5.6 μ \times 1.4 μ ; basidiospores hyaline, elliptic, flattened on one side with a minute apiculus (Fig. 2d), 5.7–7.1 \times 2–3.3 μ ; conducting organs in hymenium few, filled with light yellow or hyaline, globular scanty contents.

Rot.—White fibrous rot in the wood which is turned light pink. Reddish brown to chocolate coloured zone lines in the rotted wood.

Specimens examined: Uttar Pradesh: Chakrata, on oak wood—Konain, October 4, 1936, **2221**; September 16, 1949, **5325**; on dead *Betula utilis*, Mundali, September 18, 1949, **5328**; on coniferous wood, on dead spruce (*Picea morinda*)—Mundali, June 19, 1936, **2227**; Molta, June 22, 1936, **2207**; on dead fir (*Abies pindrow*)—Mundali, June 4, 1936, **2229**; Almora, Ranikhet, Chaubatia, November 3, 1932, **2204, 2205, 2206**. East Punjab: on dead *Prunus* sp.—Kulu, Jhuninala, October 28, 1940, **3061**; on dead *Quercus incana*, Garsha, October 25, 1940, **3053**; Kasol, October 10, 1940,

* The colours described under inverted commas are according to R. Ridgway's Color Standard and Color Nomenclature, Washington, 1912.

† Numbers in bold type refer to the specimens deposited at the herbarium of the Institute. Locality, host and date of collection of the specimens are given.

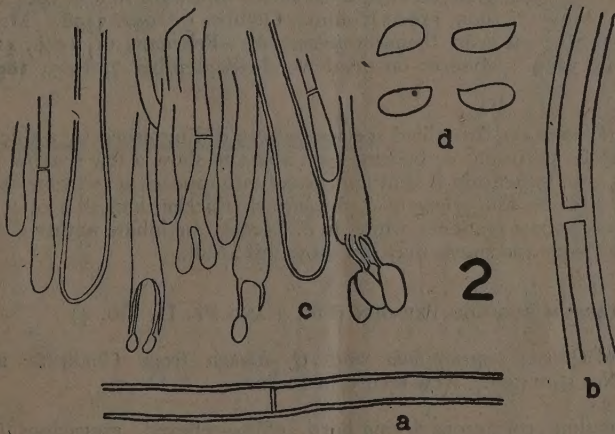
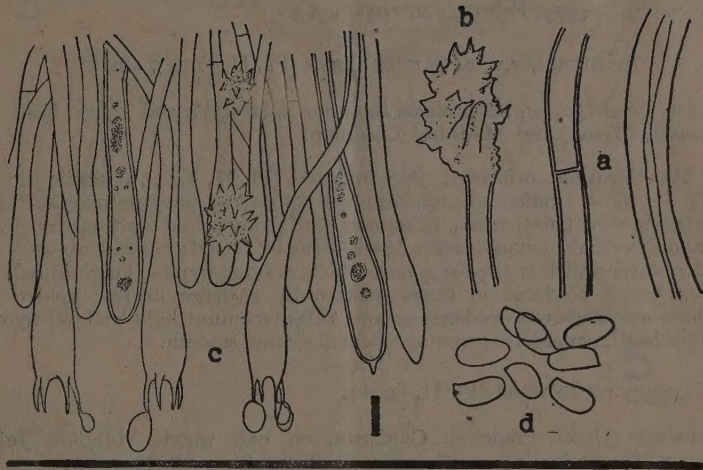


Fig. 1.—*Stereum hirsutum*.—*a*, thick-walled hyphae from context; *b*, hyphae with crystalline deposit in context; *c*, hymenial layer showing basidia, basidiospores, conducting organs and encrusted hyphae; *d*, basidiospores. All $\times 1300$.

Fig. 2.—*Stereum fasciatum*.—*a*, thick-walled hypha from context; *b*, thick-walled hypha constituting hairy upper surface; *c*, hymenial layer showing basidia and basidiospores; *d*, basidiospores. All $\times 1300$.

3054, 3064. West Bengal, Kurseong, Bagdora, on dead wood—February 10, 1945, **3853.** Assam, Haltugaon, Chiknajhar, on dead wood—January 9, 1944, **3872;** Kohima, November 20, 1942, **3503.** East Pakistan, Chittagong, on dead wood—February 4, 1947, **4560;** on green tree of a jungle species—January 29, 1947, **4573;** February 2, 1947, **4569.**

STEREUM LOBATUM (KUNZE) FRIES (Pl. II, Figs. 5 AND 6)

Occurrence.—On dead *Quercus*, *Alnus nitida*, *Diospyros melanoxylon* and other hosts from Chakrata, Nainital, Assam, Mysore and Madras. Common.

Sporophore: Fructification coriaceous, thin, reflexed (Pl. II, fig. 5), sessile or substipitate; upper surface (Pl. II, fig. 6) tomentose, tomentum disappearing towards margins and in narrow zones at other places showing bared areas, 'cinnamon buff', 'clay colour' and 'tawny olive' on tomentum, 'hazel', 'walnut brown' in bared areas, concentrically zoned; context about 0.5 mm. thick excluding tomentose layer which is 0.3–0.4 mm. thick, context hyphae longitudinal, sub-hyaline, thick-walled, 3–5 μ broad, bordered on upper surface by a dense narrow golden yellow zone bearing hairs which are thick-walled, light yellow, sub-hymenium light yellow; hymenial surface (Pl. II, fig. 5) 'light buff', concentric zonations evident or not, smooth.

Rot.—White spongy rot in wood (Pl. II, fig. 6).

Specimens examined: Uttar Pradesh: Chakrata, on oak wood—Mundali, July 12, 1945, **4166, 4458;** Deoban, September 27, 1946, **4489;** Kathian, June 20, 1947, **4713;** on oak wood—Nainital, Bhowali, January 9, 1944, **3728;** on dead *Alnus nitida*—Bhowali, June 9, 1944, **4529.** Assam: on dead wood—Wahjan, May 17, 1905, **1100;** Kohima, October 9, 1942, **3498.** Madras: Coimbatore, Karian Shola, Top Slip, on dead *Diospyros melanoxylon*—February 11, 1946, **4268;** on dead wood—January 14, 1950, **5119.** Mysore: on dead wood—September 7, 1903, **1899;** January 7, 1946, **4290.**

S. fasciatum and *S. lobatum* are two allied species but are distinguished by a thicker tomentum of the former which may be persistent or become torn apart to show a few narrow bared chestnut zones while in the latter, the tomentum is thin and usually disappears at margins and other places showing bared chestnut areas. The pileus of *S. fasciatum* is thicker than that of *S. lobatum*. The margin of *S. fasciatum* has a lobate tendency while in *S. lobatum*, the lobate nature is supposed to be more pronounced though some specimens may not show this at all.

STEREUM RUGOSUM PERSOON (Fig. 3 AND Pl. II, Fig. 4)

Occurrence.—On dead *Quercus semecarpifolia* and *Q. dilatata* from Chakrata and Narkanda (Himachal Pradesh). Not common. New record in India.

Sporophore: Fructifications coriaceous drying hard, effuso-reflexed, gregarious (Pl. II, fig. 4); upper surface velvety with fine hairs sometimes glabrous with hairs falling off, wrinkled, 'pale buff'; context 0.7–1 mm. thick excluding the hairy zone which is about 0.2 mm. thick, intermediate hyphae longitudinal, hyaline, bordered on upper surface by a narrow light coloured yellow-brown zone and on lower by erect, hyaline hyphae containing coloured conducting organs, hyphae of context 2 types: (a) thin-walled (Fig. 3a), hyaline, 1.5–3 μ broad—uncommon, (b) thick-walled (Fig. 3b), hyaline, 2–5.8 μ broad—common; hymenial surface wrinkled, 'pale ochraceous buff', 'avellaneous', 'wood brown', drying 'pinkish buff', 'drab grey', bleeds if wounded when fresh; basidia subclavate (Fig. 3c), 8.5–11 \times 5–6.4 μ , sterigmata 4, 4.3 μ \times 1.4 μ ; basidiospores hyaline, elliptic, with an apiculus (Fig. 3d), 6.0–8.5 \times 2.8–4.2 μ ; conducting organs numerous in hymenium, coloured, filled with granular or oily yellow or brownish yellow contents (Fig. 3e), 36–45 \times 6–7 μ .

Rot.—White fibrous rot.

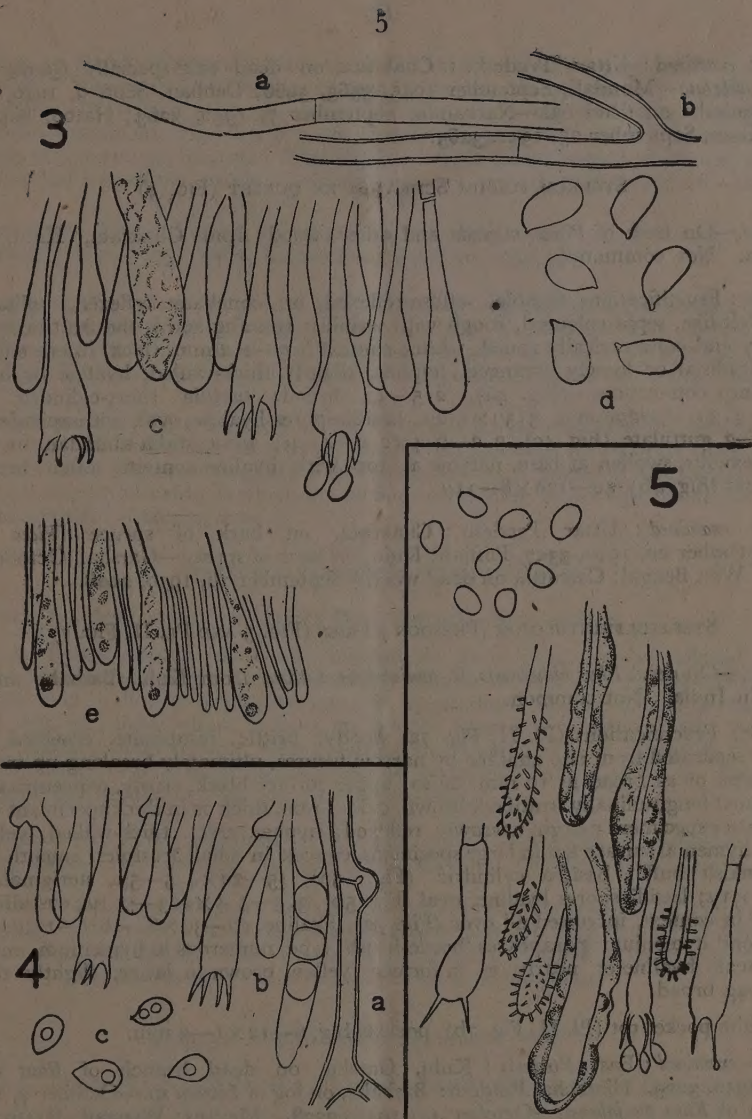


Fig. 3.—*Stereum rugosum*.—*a*, thin-walled hyphae from context; *b*, thick-walled hyphae from context; *c*, hymenial layer showing basidia, basidiospores and conducting organs; *d*, basidiospores; *e*, hymenial layer showing conducting organs. *a*—*d* $\times 1300$, *e* $\times 580$.

Fig. 4.—*Stereum fuscum*.—*a*, thick-walled hyphae from context showing clump connection; *b*, hymenial layer showing basidia, basidiospores and gleocystidia; *c*, basidiospores. All $\times 1300$.

Fig. 5.—*Stereum frustulosum*.—*a*, hymenial layer showing basidia, cystidia and bottle-brush paraphyses; *b*, basidiospores. All $\times 1300$.

Specimens examined: Uttar Pradesh: Chakrata, on dead oak specially *Quercus semecarpifolia* and *Q. dilatata*—Mundali, September 1945, **3965**, **3966**; Deoban, Sept. 9, 1949, **5321**, **5335**. Himachal Pradesh: on dead oak—Narkanda, September 7, 1941, **3263**; Hatoo, September 11, 1941, **3264**; Gaos, September 25, 1941, **3265**.

STEREUM FUSCUM SCHRADER EX QUELET (FIG. 4)

Occurrence.—On bark of *Picea morinda* and other wood from Chakrata, Kulu, Darjeeling and Calcutta. Not common.

Sporophore: Fructifications flexible, effuso-reflexed or conchate reflexed, solitary; upper surface soft, felt-like, sepia coloured, rough with wrinkles running across the fruit-body; hymenial surface lightly and concentrically zoned, white; context 0.9—1.2 mm. thick, intermediate layer of hyphae longitudinal or loosely arranged, hyphae, slightly thick-walled, hyaline or brown, with numerous clamp connections (Fig. 4a), 2.5—5 μ broad; basidia short-cylindric (Fig. 4b), 8—10 \times 3.5—4.3 μ , sterigmata 4, 3.5 μ \times 1.2 μ ; basidiospores hyaline, oval, with apiculus indistinct or minute, 0—2 guttulate (Fig. 4c), 3.2—6.4 \times 2.0—4.4 μ ; gleocystidia abundant in hymenium, embedded, flexuous, swollen at base, narrow at top with hyaline contents often breaking into cylindric blocks (Fig. 4b), 40—120 \times 8—11 μ .

Specimens examined: Uttar Pradesh: Chakrata, on bark of spruce (*Picea morinda*)—Mundali, September 20, 1949, **5327**. Punjab: Kulu, on bark of spruce—Garsha, October 26, 1940, **4017**, **4040**. West Bengal: Calcutta, on dead wood—September 16, 1930, **2208**.

STEREUM FRUSTULOSUM (PERSEON) FRIES (FIG. 5 AND PL. II, FIG. 7)

Occurrence.—On dead *Rhus himalensis*, *R. punjabensis*, *Litsaea* from Kulu, Bashahr and Madras. New record in India. Not common.

Sporophore: Fructifications (Pl. II, Fig. 7a) woody, brittle, resupinate, crowded appearing confluent but separated from one another by narrow fissures, ultimately breaking up into frustules small, 2—3 mm. or as broad as 10 mm. or so; upper surface black, crusty, concentrically sulcate, glabrous; context longitudinally stratified, brown, 0.6—1 mm. thick or in thick specimens upto 3 mm. thick, in the latter specimens margin narrowly reflexed; hyphae erect, thick-walled, yellow, 2.5—4.5 μ broad; hymenial surface flat in large specimens, convex in small frustules, smooth or slightly cracking, 'pinkish buff'; basidia cylindric (Fig. 5a), 15—20 \times 4.5—5 μ , sterigmata 4, long, slender, 6.3 μ \times 1 μ ; basidiospores hyaline, oval (Fig. 5b), 3.3—4.4 \times 2.3—3.1 μ ; cystidia common, hymenial and in context, incrustated all over (Fig. 5a), hyaline, 20—30 \times 8—10 (—13) μ , projecting upto 10 μ beyond hymenium; paraphyses 'bottle-brush' type, numerous in hymenium and different zones of context, hyaline or nearly so in former, yellow brown in latter, slightly thick-walled (Fig. 5a), 3—4 μ broad.

Rot.—White pocket rot (Pl. II, Fig. 7b), pockets big, 6—12 \times 1—3 mm.

Specimens examined: East Punjab: Kulu, Garsha, on dead branch of *Rhus himalensis*—October 26, 1940, **3229**. Himachal Pradesh: Bashahr, on log of *Litsaea* sp.—October 7, 1941, **4168**; on dead stem of *Rhus punjabensis*—October 14, 1941, **3328**. Madras: Wynaad, Kattiyar Reserve Forest, January 23, 1946, **4251**.

STEREUM UMBRINUM BERKELEY AND CURTIS (FIG. 6)

Occurrence.—On dead wood from Dehra Dun, Calcutta. Not common.

Sporophore: Fructifications resupinate, occasionally reflexed for a little breadth at edge, not separable from wood; context 0.4—0.6 mm. thick, light yellow composed of loosely interwoven hyphae not forming an intermediate layer, hyphae sub-hyaline to light yellow, slightly thick-walled

(Fig. 6a), 3—4.5 μ broad; hymenial surface cracking, 'ecru-drab' mainly, probably fading at places to 'pinkish buff', 'vinaceous buff' becoming 'benzo brown', 'drab' when old; basidia sub-clavate (Fig. 6b), hyaline, 13—16 \times 5.5—6.5 μ , sterigmata 4, 4.5 μ \times 1.7 μ ; basidiospores hyaline, oblong-elliptic, apiculus prominent (Fig. 6c), 6.7—8.5 \times 2.8—3.9 μ ; cystidia brown in embedded ones to nearly hyaline in hymenium, incrustated (Fig. 6d), arise from central region of context and rise upto sub-hymenium and hymenium, rarely extending upto 10 μ beyond it, 100—150 \times 6—10 μ .

Species examined: Uttar Pradesh: Dehra Dun, on dead wood—New Forest, August, 1946, 4638; Sabhawala, August 1951, 5482; Karwa Pani, April 26, 1952, 5892.

The species usually occurs resupinate and this feature together with the absence of any intermediate layer of hyphae longitudinally arranged which characterise most species of *Stereum*, may lead workers to regard the plant as a *Peniophora*. Examination of a big collection would however reveal some effuso-reflexed forms so as to locate the species to *Stereum* and not to *Peniophora*.

Stereum umbrinum may be recognised by the brownish purple colour in the hymenium and by its characteristic cystidia which are brown with scanty incrustations, which bring them near to setae from which they are however distinguished by their pale colour, longer in length, and by reactions with dilute potassium hydroxide in which the sections containing brown cystidia do not turn darker, as happens to sections containing setae.

STEREUM POPYRINUM MONTAGNE (FIG. 7)

Occurrence.—On dead wood from Dehra Dun, Calcutta. Not common.

Sporophore: Fructifications resupinate, inseparable from host, rarely reflexed at margins; upper surface tomentose, concentrically sulcate, 'cinnamon buff' in dry specimens; context 0.3—0.5 mm. thick, yellow, intermediate layer of longitudinal hyphae loosely arranged, hyphae thick-walled (Fig. 7a), light yellow, 2.5—4.3 μ broad; hymenial surface smooth, 'syal brown', 'snuff brown'; basidiospores hyaline, elliptic with a short apiculus (Fig. 7b), 5—8.5 \times 2.8—4.3 μ ; cystidia brown with heavy hyaline incrustations on peripheral half, confined to hymenium and projecting upto 30 μ beyond it (Fig. 7c), 50—70 \times 8—20 μ .

Specimens examined: Uttar Pradesh: On dead wood—Dehra Dun, Lachiwala, November 11, 1923, 1649, 1650. West Bengal: On dead wood—Calcutta, October 12, 1931, 2214, 4024.

S. umbrinum and *S. papyrinum* have both brown cystidia but incrustations on them are scarce in the former and heavy in the latter. Cystidia of *S. umbrinum* are long and narrow while those of *S. papyrinum* are short and broad. The two species are also distinguished by the colour of the hymenium which has purple shades in *S. umbrinum* and brown in *S. papyrinum*.

STEREUM SCHOMBURGKII BERKELEY (FIG. 8)

Occurrence.—On dead wood of *Acacia catechu* and other hosts from Dehra Dun. Not common.

Sporophore: Fructifications coriaceous, effuso-reflexed; upper surface soft, velvety, concentrically zoned, 'tawny olive', 'saccardo's umber'; context 0.5—0.7 mm. thick, intermediate layer of hyphae longitudinal, bordered on upper surface by loosely arranged hyphae, hyphae thick-walled with broad or narrow lumen (Fig. 8a), light brown to nearly hyaline, 2—4.5 μ broad, hymenial surface with light wrinkles, zoned, 'snuff brown', 'saccardo's umber'; cystidia hymenial, light brown, thick-walled, incrustations scanty, mostly on upper half (Fig. 8b), 35—50 \times 5.3—6.7 μ , projecting upto 20 μ beyond hymenium.

Specimens examined: Uttar Pradesh: Dehra Dun, Lachiwala, on dead wood, November 16, 1923, 1648; Timli, on dead wood of *khair* (*Acacia catechu*) November 9, 1945, 4060.

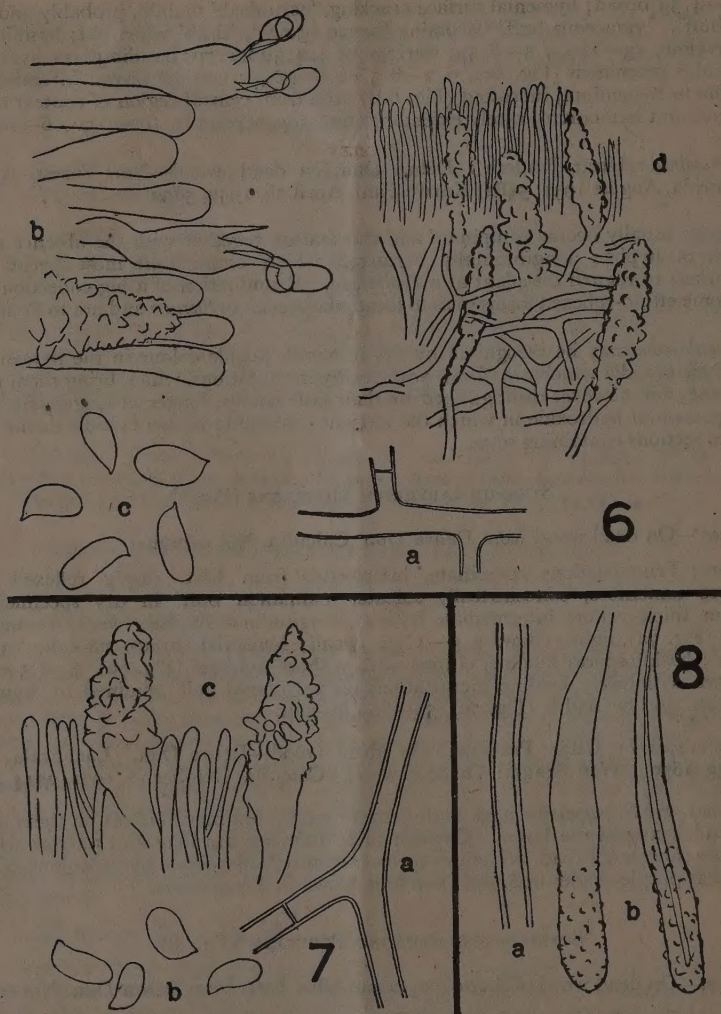


Fig. 6.—*Stereum umbrinum*.—a, thick-walled hypha from context; b, hymenial layer showing basidia, basidiospores and cystidium; c, hymenial layer and part of context showing distribution of cystidia; d, basidiospores. a — c $\times 1300$, d $\times 580$.

Fig. 7.—*Stereum papyrinum*.—a, thick-walled hypha from context; b, hymenial layer showing cystidia. a $\times 1300$, b $\times 450$.

Fig. 8.—*Stereum schomburgkii*.—a, thick-walled hypha from context; b, cystidia. All $\times 1300$.

According to Lloyd*, *Stereum schomburgkii* is probably the same as *Stereum membranaceum* which is generally known as *Stereum papyrinum*. Both have coloured cystidia and according to Lloyd "the main difference is the colour of the hymenium, umber in the former, violaceous in the latter", though he states that the violet colour gets lost in old specimens. In our materials which represent old collections, the colour of the hymenium in both the species have shades of brown.

STEREUM FERREUM BERKELEY AND CURTIS (FIG. 9)

Occurrence.—On bark of dead *Taxus baccata* from Bashahr. Not common. New record in India.

Sporophore: Fructifications resupinate becoming reflexed at margins, brittle when dry; upper surface glabrous, 'drab', 'hair brown' and 'fuscous'; context 1—1.25 mm. thick, intermediate layer of longitudinal hyphae light brown, bordered on upper surface by a reddish brown zone, hyphae either hyaline, or nearly so, thin-walled, 4—6 μ broad, not common or brown, thick-walled, 2.5—3.2 μ broad, common; hymenial surface cracking, uneven, 'avellaneous' to 'wood brown', cystidia arise deep from context, rise upto hymenium or extend 10—15 μ beyond it, thick-walled, light brown incrustations prominent in those situated in hymenium and on upper half, scanty or apparently lacking in embedded ones (Fig. 9) 20—50 \times 3—6 μ .

Specimens examined: Himachal Pradesh: On bark of dead *Taxus baccata*—Bashahr, Khanoti forests, June 15, 1946, 4405.

Miss Wakefield to whom the fungus was referred stated that it is near *Stereum chailleti* or *Stereum ferreum*. From a study of the fungus it appears to resemble closely with *S. ferreum* which name has therefore been suggested for the fungus.

The fungus resembles superficially *S. frustulosum* in the texture of fruit body, colour, etc. *S. ferreum* tends to crack longitudinally and transversely to give the appearance of small frustules which characterise *S. frustulosum*. The two species however can at once be distinguished by the character of cystidia and by the presence of 'bottle-brush' paraphyses in *S. frustulosum*.

PENIOPHORA FILAMENTOSA (BERK. & CURTIS) BURT (FIG. 10 AND PL. I, FIGS. 2 AND 3)

Occurrence.—On dead wood of *Quercus dilatata*, *Picea morinda* and *Pinus excelsa* from Chakrata. Common. New record in India.

Sporophore: Fructifications broadly effused, loosely adnate on wood, growing margins fan-shaped with a thin mycelium running into much branched rhizomorphic strands (Pl. I, Figs. 2 and 3); rhizomorphs (Pl. I, Fig. 2a) 'clay color', 1 mm. or more thick, with an outer rind of dark brown and inner core of colourless hyphae, 3.3—10 μ broad with star-shaped crystals in core; context 0.8—1.1 mm. thick, hyphae thick-walled, hyaline or yellow, with or without incrustations, 3—8.5 μ broad; hymenial surface (Pl. I, Figs. 2b and 3) cracking, uneven, 'ochraceous buff' over sterile region becoming paler, 'pale ochraceous buff' or rarely 'orange cinnamon' and 'cocoa brown' in the hymenium, basidia clavate (Fig. 10a), 8.3—12 \times 5 μ , sterigmata 4, 5 μ \times 1.4 μ , basidiospores hyaline, oval (Fig. 10b), 3—4 \times 2—2.5 μ ; cystidia numerous, in sub-hymenium and hymenium, encrusted along whole length (Fig. 10a), hyaline 40—60 \times 5—7.5 μ , projecting upto 40 μ beyond hymenium.

Rot.—White pocket rot on oak but white, fibrous on conifers in advanced stages (Pl. I, Fig. 2c)

* Lloyd, C. G. (1920). Mycological Notes No. 63, Note 847, p. 960.

Specimens examined: Uttar Pradesh : Chakrata, on log of *Quercus dilatata*—Mundali, October 20, 1943, 3959; Mundali, September 18, 1945, 3967; Deoban, July 6, 1945, 3998; Mundali, October 1, 1946, 4540; Mundali, September 20, 1949, 5331; on log of *Picea morinda*—Deoban, October 3, 1943, 4739; on log of *Pinus excelsa*—Kathian, June 21, 1947, 4695. New record in India.

Sporophore No. 4540 of the fungus was sent to Miss Wakefield who identified it as *Peniophora radicata* P. Henn. Hennings however described the species under *Corticium* as *C. radiculatum*, a name which was antedated by *Corticium filamentosum* proposed by Berkeley & Curtis. Burt later made a new combination of the species under *Peniophora*.

PENIOPHORA GIGANTEA (FRIES) MASSEE (FIG. 11)

Occurrence.—On bark of dead *Picea morinda* and *Abies pindrow* from Chakrata and Bashahr. Not common. New record in India.

Sporophore: Fructifications broadly effused, when dry parchment-like, separating from the substratum at edges; context 0.23–0.32 mm. thick, light yellow under microscope, hyphae thick-walled, individually hyaline or nearly so, 3–6.5 μ broad; hymenium cracking ‘pale ochraceous buff’; basidia persistent in dry specimens, clavate (Fig. 11a), 8–10 \times 3–4 μ ; basidiospores hyaline, oval, pointed at base (Fig. 11b), 4–6.7 \times 2–3.2 μ ; cystidia hyaline, incrustated throughout, conical, (Fig. 11b) confined to a zone of about 100 μ in the hymenium, 35–50 \times 7–15 μ , mostly embedded or projecting upto 35 μ beyond hymenium.

Specimens examined: Uttar Pradesh : Chakrata, on bark of dead spruce (*Picea morinda*)—Mundali, June 8, 1947, 5251. Himachal Pradesh : on bark of dead fir (*Abies pindrow*)—Bashahr, Narkanda, October 30, 1941, 4848.

PENIOPHORA VITICOLA (SCHWEINITZ) V. HOHNEL AND LITSCHAUER (FIG. 12)

Occurrence.—On dead wood of *Taxus baccata* from Bashahr. Rare. New record in India.

Sporophore: Fructifications resupinate, not easily separable from host; subiculum in form of short branched rhizomorphic strands, ‘zinc orange’, ‘ochraceous orange’; context 0.3–0.5 mm. thick with one or two compact zones of dark brown incrustated hyphae alternating with hyaline zones of thick-walled hyaline hyphae, 2–4 μ broad; hymenial surface cracking, ‘ochraceous buff’—the thin cuticle falling off exposing ‘zinc orange’ colour of context; spores hyaline, oval (Fig. 12a), 6.4–7.1 \times 5–5.5 μ ; cystidia hyaline, thin-walled, not incrustated, (Fig. 12b) 20–35 \times 8–14 μ , projecting upto 30 μ beyond hymenium.

Rot.—White spongy rot in wood within which small, thin, white mycelial sheets develop.

Specimens examined: Himachal Pradesh : On dead wood of *Taxus baccata*—Bashahr, Gahan forest, June 17, 1946, 4430.

CORTICIUM CAERULEUM (SCHRADER) FRIES (FIG. 13)

Occurrence.—On dead *Cotoneaster* and other hosts from Dehra Dun and Bashahr.

Sporophore: Fructifications resupinate; context 0.25–0.3 mm. thick, hyphae blue under hymenium, hyaline to light yellow at other places, with or without incrustations on wall, with clamp connections (Fig. 13), 2.8–6 μ broad; hymenial surface ‘tyran blue’, ‘dark tyran blue’ to ‘indigo blue’.

Rot.—White spongy rot in sapwood.

Specimens examined: Uttar Pradesh : On dead wood—Dehra Dun, Lachiwala, December, 1895, 176. Himachal Pradesh : On dead *Cotoneaster* sp. Bashahr, October 11, 1941, 4857.

* Burt, E. A. (1925). The Thelephoraceae of North America, XIV. Annals of the Missouri Botanical Garden, Vol. 12, No. 3, pp. 213–357.

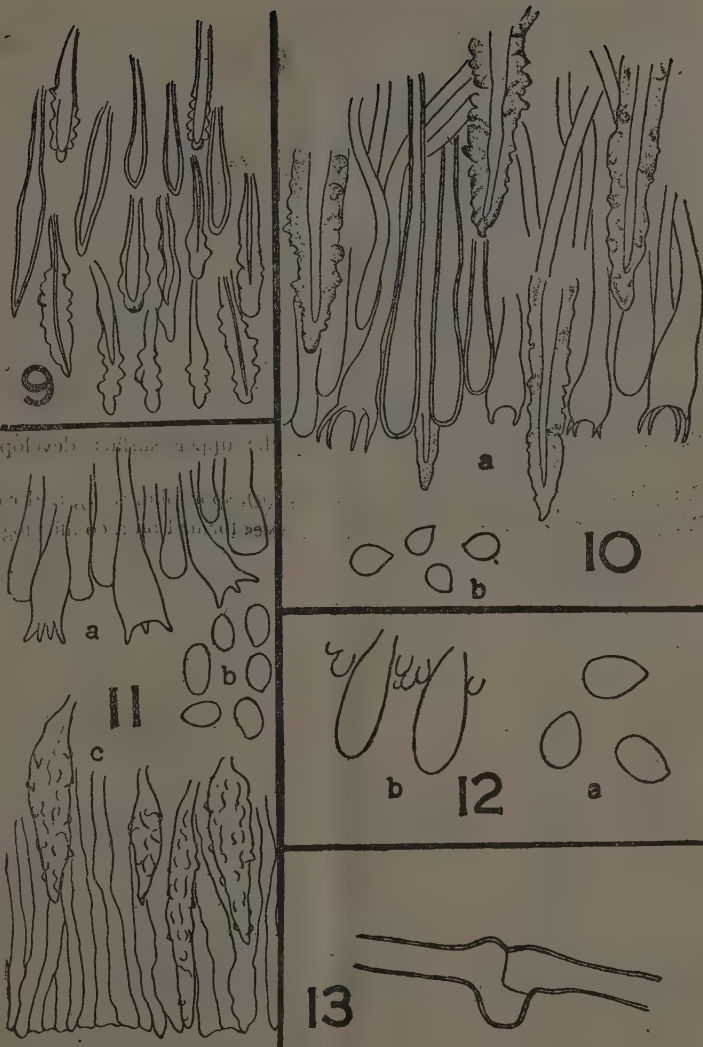


Fig. 9.—*Stereum ferreum*, showing cystidia. $\times 580$.

Fig. 10.—*Peniophora filamentosa*.—*a*, hymenial layer showing basidia and cystidia; *b*, basidiospores. All $\times 1300$.

Fig. 11.—*Peniophora gigantea*.—*a*, hymenial layer showing basidia; *b*, basidiospore; *c*, hymenial layer showing cystidia. *a* $\times 350$, *b* $\times 1300$, *c* $\times 350$.

Fig. 12.—*Peniophora viticola*.—*a*, basidiospores; *b*, cystidia. *a* $\times 1300$, *b* $\times 550$.

Fig. 13.—*Corticium caeruleum*, showing a hypha with clamp connection. $\times 1300$.

Fig. 1.—*Stereum fasciatum*.—Sporophores showing the upper surface developed on a log of *Quercus incana*.

Fig. 2.—*Peniophora filamentosa* showing rhizomorphs (*a*), sporophores (*b*), and rot (*c*).

Fig. 3.—*Peniophora filamentosa*.—Resupinate sporophores formed on a conifer log.

PLATE I



PLATE II



- Fig. 4.—*Stereum rugosum*.—Sporophores on a stump of *Quercus semecarpifolia*.
Fig. 5.—*Stereum lobatum*.—Sporophores showing hymenial surface formed on a log of *Quercus* sp.
Fig. 6.—*Stereum lobatum*.—Sporophore showing upper surface.
Fig. 7.—*Stereum frustulosum*.—Sporophore on fallen log of oak (a) and the decay (white pocket rot) in wood caused by the fungi (b).

